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TOSHIBA MAKES BREAKTHROUGH IN SOLID ELECTROLYTE SOLAR CELL

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May 02, 2000 (AsiaPulse via COMTEX) -- (Full text of a statement. Contact details below.)

GLASGOW, May 2 Kyodo JBN-AsiaNet/--Toshiba Corporation today announced a major breakthrough in solar cells that is expected to realize simpler, low-cost cell production and significantly extended scope of application for solar batteries. The company has successfully solidified electrolytes, the key material of next-generation, organic-dye-based solar cells, ending the potential hazard of leaks of liquid electrolyte. Cells based on this achievement offer a solar-energy conversion efficiency of 7.3 percent and can be formed on a plastic substrate, opening up the way to a wide range of new applications for solar batteries.

Details of the new process will be announced at the 16th European Photovoltaic Solar Energy Conference and Exhibition, to be held from May 1 to May 5 in Glasgow, Scotland.

Organic-dye-sensitized solar cells are widely recognized as a promising and much-needed replacement for conventional solar cells. Manufactured using a semiconductor manufacturing process, today's silicon-based solar batteries are expensive to produce and susceptible to damage from impurities. As they also have the disadvantage of not being inherently transparent, they are poorly suited to installation on windows, and their use in products any smaller than calculators-including watches-is limited.

Organic-dye-sensitized solar cells are transparent, much easier to manufacture, and enjoy a much cheaper production process-60 percent less expensive than that for silicon-based cells. Until now, these advantages have been undermined by the danger of leakage of liquid electrolyte. Solidification is the solution, but efforts to realize this have met limited success; electrolytes typically melt when exposed to temperatures of 60oC and more, too low level for practical applications.

Toshiba has isolated and identified chemicals that support electrolyte solidification while allowing retention of the current manufacturing process. Toshiba has tested its solidified

electrolyte to a temperature of 120oC, more than enough for practical application, and posits that it will not melt before thermal decomposition at around 250oC.

Toshiba's solidified electrolyte also achieves the breakthrough of allowing cells to be formed on a plastic substrate. Such cells are between 20 and 50 percent lighter than those formed on glass, now the most widely used substrate. In the company's experimental cells, electrolyte is inserted between a titanium dioxide (TiO_2) layer and a transparent counter electrode, and can be solidified at room temperature or at a faster rate by exposure to a higher temperature. To maximize its energy-conversion efficiency, TiO_2 usually needs to be baked at 450oC, which would cause the plastic substrate to melt. Toshiba has overcome
this with a simple process that allows the TiO_2 layer to be fabricated on plastics or thin organic films while maintaining its energy conversion efficiency.

The advantages of the solidified electrolyte solar cell position it to replace silicon-based solar cells in traditional applications and to extend use of solar cells to a wide range of new applications. Toshiba envisages utilization of the battery in the home, mounted indoors on windows and walls, and its application in hand-carried personal digital products, such as cellular phones.

Toshiba's patent application for the chemicals is pending, and the company expects to start to license the technology to interested parties from this summer.

Toshiba's presentation on the new cells will be held from 18:00 on May 2, the second day of the conference.

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